

AEC would consider taking action against a utility only if radiation dosages at its plant boundary exceeded the proposed 5-millirem level by "four to eight times." In extreme cases, the AEC could impose fines on a utility or suspend its reactor operating license.

If the EPA is satisfied with these policies, a number of the AEC's critics predictably are not. "It is a step in the right direction," Tamplin, at the Lawrence Radiation Laboratory in Livermore, California, concedes. But he and Gofman urge a "drastic reduction by at least a factor of 10 or preferably to zero" of exposures from reactor emissions. Anthony Z. Roisman, a Washington attorney who has represented the Sierra Club in reactor licensing interventions, says that the commission's new rules will not foreclose opposition to reactors on grounds of radioactive pollution. But he believes they will force

environmental groups to pick at more subtle points, such as potential hazards of specific isotopes. The result, Roisman says, may be to discourage a number of smaller citizens' groups from tangling with the AEC and utilities over plans for atomic power plants.

The commission was careful to point out, and its critics were quick to observe, that the proposed standards do not apply to reactors cooled by anything besides ordinary water. Thus, the nation's three experimental breeder reactors (*Science*, 11 June) are exempted, as are fuel and isotope processing plants and waste disposal sites.

AEC officials do not expect reactors cooled by gas or liquid metal, as the breeders are, to pose any serious difficulties in meeting the new standards. But the nation's one nuclear fuel reprocessing plant in operation at West Valley, New York (two are under con-

struction elsewhere) appears to be more of a problem. Emissions from the plant, which is owned by the Getty and Skelly oil companies, last year included 14 curies of strontium-90 released in waste water and 1 million curies of krypton-85 vented to the atmosphere. Although these figures amounted to only a fraction of permitted releases, they still far exceed the emissions of PG & E's Humboldt Bay plant—the "dirtiest" of the nation's power reactors.

In reply to a question, AEC's Price said radiation exposures to persons near the West Valley plant boundary "might be" higher than exposures possible near power reactor plants. He said that the commission was considering amending its regulations to minimize emissions from reprocessing plants, but that the technical feasibility of doing so has not been established.

—ROBERT GILLETTE

## ROTC: Education Groups' Reforms Stress Flexibility, Fuller Funding

Six major higher education associations invited the press on June 4 to a Washington meeting to learn about Reserve Officer Training Corps reforms that they were urging on Congress and the Defense Department. The meeting, held in the glassy new National Center for Higher Education, could not have contrasted more sharply with the anti-ROTC upheavals at campuses a year earlier. As the two dozen middle-aged men gathered in leather chairs around a polished oval table, no onlooker would have guessed that the issue under discussion had led to an estimated \$1.3 million in property damage in 297 "violent incidents" (as counted by the Defense Department) during the 1969-70 academic year.

The reforms proposed by the education groups reflect some of the criticisms aimed at ROTC by dissident students and faculty. But the goal of these reformers was precisely the opposite of the goal of those who had sought to drive officer training from the campuses. The associations were anxious to strengthen the position of university-based officer production so that an important source of civilian influence on

the officer corps will not be lost. The expulsion of ROTC from some institutions and the declining enrollments across the nation spurred their efforts to reform the program.

In essence, the proposed changes would provide a larger role for the university in ROTC programs, greater flexibility in policies at individual campuses, and fuller federal funding of the programs. Carlisle Runge, who presided at the news conference, described the objectives of the reforms. Runge, a former assistant secretary of defense for manpower and now a professor of law at the university of Wisconsin, predicted that adoption of the proposals would lead to a better reception of ROTC in academic institutions, better relations between the Department of Defense and these institutions, and higher morale and enrollment of students in the programs.

Most of the proposed reforms were not new, and the Defense Department has already begun to implement some of them. But Larry Gladieux, a spokesman for the Association of American Universities, said many universities had complained that the services were fol-

lowing a policy of "divide and conquer." Gladieux indicated that the joint effort of the associations at this time reflected a concern that the options available to some universities should be available to all.

The first reform proposed by the education groups was to change ROTC's name. The "broad mission" of the Reserve Officer Training Corps would be more accurately reflected by calling it the "Army (or Navy or Air Force) Officer Education Program." Dale Corson, president of Cornell University and representative of the Association of American Universities, explained that the university programs reflected a desire for an officer corps that is highly educated, as distinct from trained. He added that the universities were not "looking down" on the service academies, where the emphasis in recent years has shifted to broader education.

The more substantive proposals urged that the academic status of ROTC, the academic title of each unit's commanding officer, and the credit granted for particular courses be determined in accordance with each university's procedures for its other programs. Universities were asked to establish a standing committee with general responsibility for all facets of the program and to provide for periodic evaluation.

Maximum use of civilian faculty in the ROTC curriculum was urged, and the military were asked to explore ways

of shifting as much "technical-descriptive material and field-type work" as possible to periods of training offered in "a military environment." The education groups recognized the need for future officers to become "acquainted with the customs, traditions and ceremonies" of their services through a "reasonable amount" of military assembly, wearing of the uniform, and other experiences. Military instructors, the educators proposed, should have advanced degrees and demonstrated teaching competence, recognized accountability to academic as well as military superiors, and nonclassroom contact with students. The proposed reforms also included greater minority group enrollment in ROTC.

Increases in the number of scholarships and the size of subsistence allowances were sought. Both proposals have already been submitted to Congress by the Defense Department. The legislation would approximately double the number of scholarships, which provide full tuition and textbooks, from 5500 for each service to 10 percent of the active officer strength of each service. Standard monthly subsistence allow-

ances would be raised from \$50 to \$100.

A recommendation that universities be reimbursed for ROTC overhead costs at the rate of \$500 per graduate has also been proposed by the Defense Department, but is being held up in the Office of Management and Budget. At present, the only ROTC costs paid by the services are the salaries of military instructors. Although costs to universities vary widely, the education groups considered the \$500 figure well below the actual cost to the universities of supporting ROTC programs. The Defense Department based the figure on the average cost reported in a survey of universities.

The six organizations sponsoring the changes in ROTC were the American Association of State Colleges and Universities, the American Council on Education, the Association of American Colleges, the Association of American Universities, the National Association for Equal Opportunity in Higher Education, and the National Association of State Universities and Land-Grant Colleges.

A decline in enrollment was among the factors promoting the call for re-

forms. Between the 1966-67 and 1970-71 academic years, enrollments in all three services had fallen from 260,000 to 115,000. Freshmen enrollments in the same period had fallen more sharply—from 129,000 to 46,000, a drop of 70 percent. This decline was not reflected in ROTC officer production until this year. The number of granted commissions had risen steadily, to more than 23,000 in 1969-70, but has fallen to an estimated 18,700 in 1970-71. A further decline is projected for the coming year.

The lag between falling enrollment and reduced officer production reflects, in part, an increased tendency for cadets and midshipmen to complete their training. This higher "persistence rate" is attributable to several factors, including draft pressures, the provision of ROTC scholarships by the Army and Air Force since 1964 (they were already available from the Navy), and the elimination at many campuses of compulsory ROTC, which enrolls many freshmen and sophomores who have no intention of completing the full 4 years of training.

The overall drop in enrollment is

Table 1. Balance sheet on ROTC units terminated, new ones created.

Schools in which ROTC has been disestablished or is scheduled to be disestablished (decisions reached since 1969).	New ROTC units (selected by the military departments during fiscal year 1971). Asterisks indicate predominantly Black colleges.
<p>Schools which asked the military departments to terminate their ROTC units:</p> <ul style="list-style-type: none"> <li>Harvard University</li> <li>Brown University</li> <li>Dartmouth College</li> <li>Colgate University</li> <li>Tufts University</li> <li>Stanford University</li> <li>New York University</li> <li>Princeton University</li> <li>Boston University</li> <li>State University of New York at Buffalo</li> <li>Yale University</li> <li>Pratt Institute (Brooklyn, N. Y.)</li> <li>Boston College</li> <li>Columbia University</li> <li>City College of New York</li> </ul> <p>Total, 15</p> <p>Schools where ROTC units were terminated because of low production or low enrollment and the military departments and the institutions agreed mutually to disestablish ROTC:</p> <ul style="list-style-type: none"> <li>Grinnell College</li> <li>Kenyon College</li> <li>Occidental College</li> <li>Rochester University (Air Force unit only; Navy unit remains productive)</li> <li>Hobart College</li> <li>Washington University at St. Louis</li> <li>Lawrence University</li> <li>Union College</li> <li>Trinity College</li> <li>Ball State University</li> <li>Allen Military Academy (junior college which lost its college level accreditation)</li> <li>Oklahoma Military Academy (converted to coeducational)</li> </ul> <p>Total, 12</p> <p>Final total, 27</p>	<p>Army units</p> <ul style="list-style-type: none"> <li>Alabama A&amp;M College*</li> <li>Alcorn A&amp;M College (Miss.)*</li> <li>Austin Peay State University (Tenn.)</li> <li>Campbell College (N.C.)</li> <li>East Central State College (Okla.)</li> <li>Missouri Western College</li> <li>Southwestern State College (Okla.)</li> <li>University of Tampa (Fla.)</li> <li>Weber State College (Utah)</li> <li>Wisconsin State University at La Crosse</li> <li>Wisconsin State University at Platteville</li> </ul> <p>Total, 11</p> <p>Navy units</p> <ul style="list-style-type: none"> <li>Southern University (La.)*</li> <li>Savannah State University (Ga.)*</li> <li>University of Jacksonville (Fla.)</li> </ul> <p>Total, 3</p> <p>Air Force units</p> <ul style="list-style-type: none"> <li>Angelo State University (Texas)</li> <li>Arkansas A&amp;M College</li> <li>College of Santa Fe (N. Mex.)</li> <li>Mississippi Valley State College*</li> <li>Newberry College (S.C.)</li> <li>Norwich University (Vt.)</li> <li>Parsons College (Iowa)</li> <li>Southern Utah State College</li> <li>Sul Ross State University (Texas)</li> <li>Troy State University (Ala.)</li> <li>University of Missouri at Rolla</li> <li>University of Southern Mississippi</li> <li>Valdosta State College (Ga.)</li> <li>Alabama State College*</li> <li>Grambling College (La.)*</li> <li>Baptist College of Charleston (S.C.)</li> </ul> <p>Total, 16</p> <p>Final total, 30</p>

## Curriculum Vitae: A Man of His Times

Through high school after Sputnik flew  
He topped the class of '62,  
Though cool toward sports and Boy Scout troops  
Was star of PSSC groups.

Brilliant in lab, he could fix all appliances,  
He clearly was meant for the physical sciences.  
Winner of science fairs, math contests, and,  
To be well rounded, he played in the band.  
A talent search found him (it was only his due),  
And he joined Merit Scholarships' happiest few.  
So he saw himself, in his gaudier dreams,  
In ultimate charge of the biggest machines.

As undergrad, he went on to excel,  
With physics going especially well.  
The sort full professors treated as peer,  
For him the track looked perfectly clear  
To tenure, grants, and trips to remember,  
Even to Stockholm some fine December.  
At graduate school, with bills still to pay,  
An NSF fellowship smoothed out the way.  
Even the summers were never a bore

At Argonne, Brookhaven, Livermore,  
Or other laboratories, whence  
He always repaired at federal expense.

His Ph.D. came through on time  
With the bumper crop of '69—  
Just as the slump in science started.  
But, in the grand tradition, he departed  
Via NATO fellowship to CERN;  
Academe was bleak on his return,  
But he snared a job, one of the few,  
And lost it when the grant fell through.  
Not what men of his stripe expect,  
From proud and subsidized elect  
The hard transition was complete  
To morose and unemployed elite.

And sadly, since he's joined the latter,  
He'll never get to the heart of matter.  
For, from the depths of the manpower pool,  
Our man's applied to medical school.

—JOHN WALSH

partly explained by conversions to voluntary programs. Between 1967-68 and 1970-71, a total of 63 Army and 20 Air Force units canceled compulsory training.\* In 1969-70, when 38 Army units were made voluntary, total freshman enrollment in Army ROTC fell from 72,000 to 41,000.

But these were also the years when student opposition to the war in Southeast Asia reached its peak. The resulting hostility to a military presence on campus not only reduced enrollments, but, since 1969, 15 schools have asked the armed services to terminate ROTC units.

Twelve additional schools dropped ROTC units by mutual agreement with the services, most of them because of low officer production or low enrollment. But a total of 30 schools were selected for new units during the academic year just completed. The resulting shift in distribution of ROTC programs is dramatic. All but one (Stanford) of the 15 schools ejecting ROTC programs were prestigious institutions located in the northeast corner of the country. Of the 30 schools securing new units, all but seven are in southern or border states. Most of these schools are little known outside their regions (see Table 1).

Seven of the new units were established at predominantly black colleges. The increase brings the total at these schools to 27 units at 24 campuses. The black colleges, especially in a time of economic doldrums, welcome ROTC programs because they provide needy students with financial aid and assure graduates of a job and the rank of an officer.

The prestige of the military in the South undoubtedly contributes to the relative popularity ROTC enjoys on southern campuses. While buildings were being burned at large northern universities, many colleges in the South experienced scarcely a ripple of protest. At Northeast Louisiana University, for example, what little hostility appeared was directed against the compulsory status of ROTC. Glenn Powers, academic vice president of the university, compared the "grumbling" to objections against required courses in English or physical education. Since the compulsory status of ROTC was dropped in 1969, Powers told *Science*, cadet morale has been higher, teaching objectives have been easier to meet, and performance on inspections has improved.

Meanwhile, some of the universities in the North have been having second thoughts about ROTC. At Princeton, where students and faculty during the Cambodia crisis had voted overwhelmingly to oust officer training, a referendum this spring showed majority

undergraduate support for reinstatement of the program. However, the referendum stipulated conditions for reinstatement, conditions that were largely incorporated in proposals by president Robert F. Goheen for new negotiations with the Army and Air Force: no academic credit for the program, no academic rank for its officers, and no net cost to the university. The Defense Department has taken steps in these directions, but it remains doubtful that it is prepared to go quite so far.

The shift in attitude toward ROTC at Princeton has been evident at other campuses. At Northwestern University, for example, the faculty recently voted to reinstate credit for four naval science courses, thus reversing a similar vote taken the previous spring. The issue of academic credit has been resolved in different ways at different campuses. At Johns Hopkins University, where for many years students in the engineering school had received no credit for military science courses, the same principle was extended to the division of arts and sciences in 1968. At the University of Maryland, the faculty voted to continue Air Force ROTC, but without any academic credit. However, university president Wilson H. Elkins announced 20 May that "an AFROTC program without credit is not practicable." At many universities, especially the larger ones, pol-

\* At present, 42 institutions require 1 or 2 years of Army ROTC from all students; only four institutions now require Air Force ROTC. The Navy maintains no compulsory units.

icies on academic credit for ROTC courses vary among different schools and departments.

The academic rank of ROTC instructors has been another source of friction on campuses. Under the ROTC Vitalization Act of 1964, the senior officer in a unit must be granted the rank of full professor. In 1969, a Defense Department special committee on ROTC observed that the services, despite the wording of the law, have not insisted upon a special title for ROTC department heads. The Defense Department has since indicated that a title such as "visiting professor" is acceptable, provided the privileges and prerequisites of professorial rank (excluding tenure) accompany the position and the title is not "demeaning or indicative of some lesser status."

Behind the semantics of the title of instructors and similar issues lies the fundamental question of the identity of ROTC. The military is anxious that universities grant recognition to the educational worth of their offerings, while many faculty, students, and university administrators want to avoid any confusion between military and academic virtues. The formulas by which ROTC status is established on

campuses, especially the credit granted courses, can have considerable impact on the number and quality of students entering the officer corps.

The proposals of the education associations reflect their double objective: they want to avoid penetration of the university by the military and to assure penetration of the military by civilian higher education. The Benson Report, upon which the associations based most of their recommendations, argued that the most important reason for continuation of ROTC is its contribution to "a civilian-oriented military leadership for a civilian-oriented country."

This ultimate goal has not really changed as university dissent over ROTC has percolated up from student demonstrators to the education "establishment." The reformers seek to strengthen ROTC for the same reason that radicals have sought to abolish it. The Benson Committee, military as well as civilian members, emphasize that "officer education by means of ROTC on civilian campuses strengthens our traditional civilian participation in and influence upon the military, whereas alternative plans yield more to domination by the military organization acting

on its own." The Committee warned that, if ROTC were removed from the nation's campuses, "there would be grave danger of isolating the services from the intellectual centers of the public which they serve and defend."

Isolation of the military establishment from the Ivy League (and vice versa) seems to be the chief immediate result of the recent upheavals on campus. But declining enrollments across the country may be more profoundly influenced by reduced pressures from the draft. Should an all-volunteer army be established, civilian-oriented students will find little incentive to join ROTC. Then, at the very moment when the ranks are filled with career soldiers, the officer corps will be denied a major source of leadership from the civilian sector of society. The result could be a peacetime military force with over 2 million men and a mind of its own.

—D. PARK TETER

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## Nuclear Tests: Big Amchitka Shot Target of Mounting Opposition

A wide range of opposition, a bomb that may be useless, and a number of complex political considerations have raised the possibility that President Nixon may soon cancel the scheduled test of the largest underground nuclear device ever to be detonated by the Atomic Energy Commission. The blast, planned for this fall on the Aleutian Island of Amchitka, involves a 5-megaton bomb designed as a warhead for the Spartan antiballistic missile. To date, the AEC has spent some \$160 million in preparation for the test. This includes the cost of a 1-megaton "calibration shot," code-named Milrow, which the AEC exploded underneath Amchitka on 16 October 1969.

The AEC encountered a good deal of opposition prior to the 1969 test (*Science*, 22 August 1969). And much

of the debate surrounding the proposed 5-megaton test, with the code name of Cannikan, revolves around points that were raised against the 1969 test. Opponents of the test fear that the explosion could trigger a major earthquake, possibly leading to a destructive sea wave known as a tsunami. Tsunamis resulting from natural earthquakes in the Aleutians have caused extensive damage as far away as California and Hawaii. The opponents, including many Alaskans, are also worried about damage to the island's wildlife from the shock of the explosion, as well as possible leakage (venting) of nuclear material that could contaminate the ocean or the atmosphere.

Located near the western end of the Aleutian chain, the barren island

serves as a refuge for sea otters, seals, and sea lions, as well as a nesting ground for two rare birds, the American bald eagle and the peregrine falcon. The bomb will be detonated at the bottom of a 6200-foot hole dug by the AEC.

In response to the Environmental Policy Act of 1969, the AEC has issued a draft of an environmental impact statement describing the probable consequences of the underground blast. And although many environmentalists believe the AEC's statement to be inadequate under the law (because they claim the statement reads more like a sales pitch than a catalog of possible environmental effects), the statement has formed the basis for a wider, more detailed discussion of the possible environmental consequences of the test. In response to a request from Alaska's Governor William A. Egan, the Environmental Protection Agency held hearings from 16 to 19 May in Anchorage and Juneau, Alaska. There the AEC heard a parade of witnesses testify against the test. In fact, the only people speaking in favor of the test at the Alaska